Chemical Physics for New Energy

The rising worldwide demand for energy and the need for energy sources that reduce CO_2 emissions require new approaches to energy technologies. These new approaches will include new energy sources (e.g., solar energy, advanced nuclear energy, fusion energy, and alternative feedstocks for fuels), more efficient ways to use energy (e.g., fuel cells and solid state lighting), and improved efficiency in energy storage (e.g., electrical and chemical energy storage). There are many common underlying scientific questions that need to be addressed to advance new energy technologies, such as:

- How can light fields be manipulated to promote desired conversions?
- How can light absorption be controlled to produce energy carriers and intermediates efficiently and selectively?
- What controls the ability of materials to store, transfer, and transport charged species such as electrons, holes and ions?
- How can energy be directed to control chemical transformations such as with catalysts?
- How do charge transfer and chemical transformation couple in photoelectrochemical generation and electrochemical storage of energy?
- What properties of materials determine their behavior under extreme conditions (high temperatures, pressures, and flux of high energy particles)?
- What is the role of condensed phase liquids, particularly aqueous liquids, in energy applications?

Chemical physics tools and approaches, which rely on model system studies of physical/chemical phenomena from the perspective of atomic/molecular and condensed matter physics, offer opportunities to develop a fundamental understanding of many of the scientific issues and answer key scientific questions important for advancing new energy technologies.

This symposium will highlight research advances that are essential to answer fundamental science questions underlying new energy technologies.

Symposium Organizers:

Bruce C. Garrett
Chemical & Materials Sciences Division
Pacific Northwest National Laboratory
Richland, WA 99352
phone: 509-372-6344
fax: 509-372-4747
email: bruce.garrett@pnnl.gov

Anders Nilsson
SUNCAT
SLAC National Accelerator Laboratory
Menlo Park, CA 94025
phone: 650-926-2233
fax: 650-926-4100
email: nilsson@slac.stanford.edu